

Tropical Cyclone Report
Tropical Storm Cristina
9-16 July 2002

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Cristina was a tropical storm that moved generally toward the west-northwest across the eastern Pacific basin with wind speeds briefly reaching 55 kt.

a. Synoptic History

Cristina originated from an area of disturbed weather that was first identified near Panama on July 6th. This weather moved westward as a tropical wave-like feature, but there was no prior continuity with a tropical wave across the Atlantic basin. The first signs of a low-level circulation appeared on the 8th, centered about 300 n mi south of Puerto Angel, Mexico. The system was upgraded to Tropical Depression Four-E on the morning of July 9th, when convection was well-enough organized to warrant a tropical cyclone classification. The depression was then located about 300 n mi south of Acapulco. The “best track” begins on the 9th. A map of the tropical cyclone’s path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1.

The depression moved just north of due westward at 10 to 15 kt for the next three days, under the steering of a mid-level ridge to its north. During this period, a hostile environment of strong vertical shear frequently affected the deep convection, causing the partial exposure of the low-level circulation center. Also, the low-level circulation often appeared elongated or perhaps non-existent, as observed from satellite imagery, while the deep convection was often poorly organized or shapeless.

Early on the 12th, the depression became Tropical Storm Cristina when deep convection developed near the center along with some banding features. An upper cut-off low over Baja California began digging southward. This weakened the steering ridge, allowing Cristina to slow its forward speed and to begin a turn toward the north-northwest. Cristina very gradually strengthened, reaching 55 kt on the 14th with tight banding features. Shortly thereafter, Cristina quickly weakened, the low-level center became fully exposed, and a west-northwestward motion was resumed under lower-level steering. By the 16th, Cristina was reduced to a swirl of low clouds moving westward over colder water about 750 n mi west-southwest of the southern tip of Baja California.

b. Meteorological Statistics

Observations (Figs. 2 and 3) used to construct the best track wind speeds and pressures are mainly satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB) and the U.S. Air Force Weather Agency (AFWA). These were supplemented by occasional QuikSCAT passes,

one of which showed several 40-kt wind speeds early on the 14th, uncontaminated by rainfall. Center position estimates based on geostationary satellite images were supplemented by SSMI and TRMM microwave images.

c. Casualty and Damage Statistics

Cristina did not affect land and there are no reports of deaths or damages.

d. Forecast and Warning Critique

Average official track errors (with the number of cases in parentheses) were 37 (11), 52 (9), 66 (7), 86 (5), and 66 (1) n mi for the 12-, 24-, 36-, 48-, and 72-h forecasts, respectively. Except for the 12-h average error, these errors are considerably smaller than the average official track errors for the 10-yr period 1992-2001 (36, 67, 97, 125, and 182 n mi, respectively). However the numbers of cases (only 1 at 72 h) are small at the longer forecast periods. It is noted that the GFDL, UKMET and GFS dynamical track models did not do as well as the official forecast at 36 through 72 h.

Average official intensity errors were 8, 10, 11, 11, and 15 kt for the 12-, 24-, 36-, 48-, and 72-h forecasts, respectively. For comparison, the average official intensity errors over the 10-yr period 1992-2001 were 7, 12, 16, 18, and 21 kt, respectively. Again, all but the 12-h average error are smaller than the previous 10-yr averages.

Table 1. Best track for Tropical Storm Cristina, 9-16 July 2002.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
09 / 1200	11.5	100.3	1008	30	tropical depression
09 / 1800	12.0	101.7	1008	30	"
10 / 0000	12.4	103.3	1007	25	"
10 / 0600	12.8	104.7	1007	25	"
10 / 1200	13.0	106.0	1007	25	"
10 / 1800	13.3	107.3	1007	25	"
11 / 0000	14.0	108.6	1007	25	"
11 / 0600	14.2	109.6	1007	25	"
11 / 1200	14.3	110.5	1006	30	"
11 / 1800	14.3	111.5	1006	30	"
12 / 0000	14.2	112.5	1005	30	"
12 / 0600	14.2	113.6	1004	35	tropical storm
12 / 1200	14.2	114.6	1004	35	"
12 / 1800	14.1	115.2	1003	40	"
13 / 0000	14.1	115.7	1003	40	"
13 / 0600	14.3	116.1	1003	40	"
13 / 1200	14.6	116.6	1000	45	"
13 / 1800	15.0	117.1	1000	45	"
14 / 0000	15.7	117.5	1000	45	"
14 / 0600	16.2	117.6	997	50	"
14 / 1200	16.6	117.8	994	55	"
14 / 1800	17.1	117.9	995	50	"
15 / 0000	17.5	118.0	1000	45	"
15 / 0600	17.9	118.5	1005	35	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
15 / 1200	18.5	119.4	1009	30	tropical depression
15 / 1800	19.1	119.8	1009	30	"
16 / 0000	19.4	120.4	1009	30	"
16 / 0600	19.7	121.1	1009	25	"
16 / 1200	19.8	121.9	1009	25	"
16 / 1800	20.0	122.7	1010	25	"
17 / 0000					dissipated
14 / 1200	16.6	117.8	994	55	minimum pressure

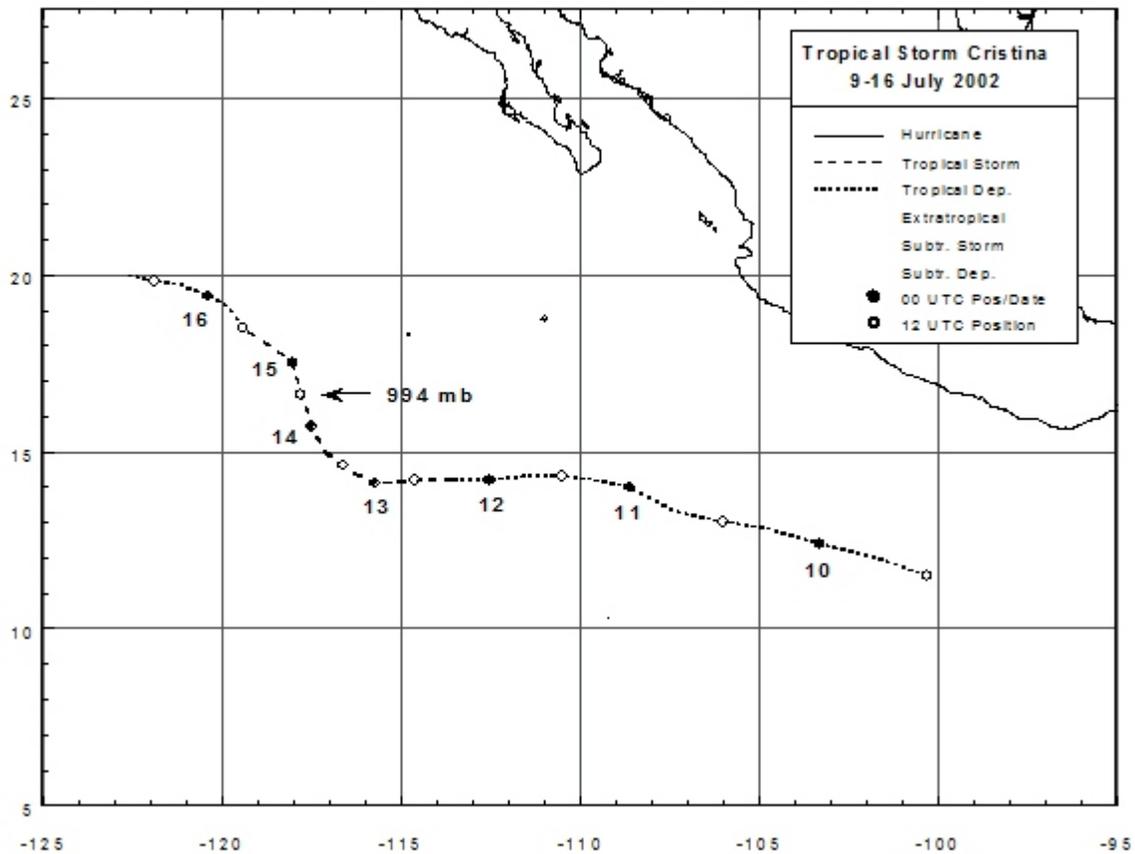


Figure 1. Best track positions for Tropical Storm Cristina, 9-16 July 2002.

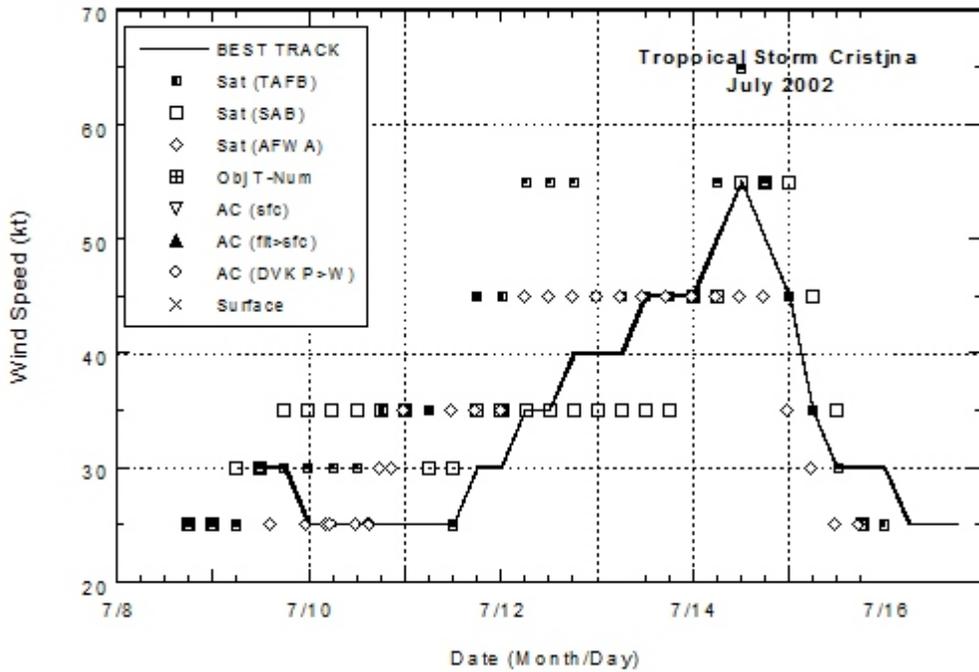


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Cristina, 9-16 July 2002.

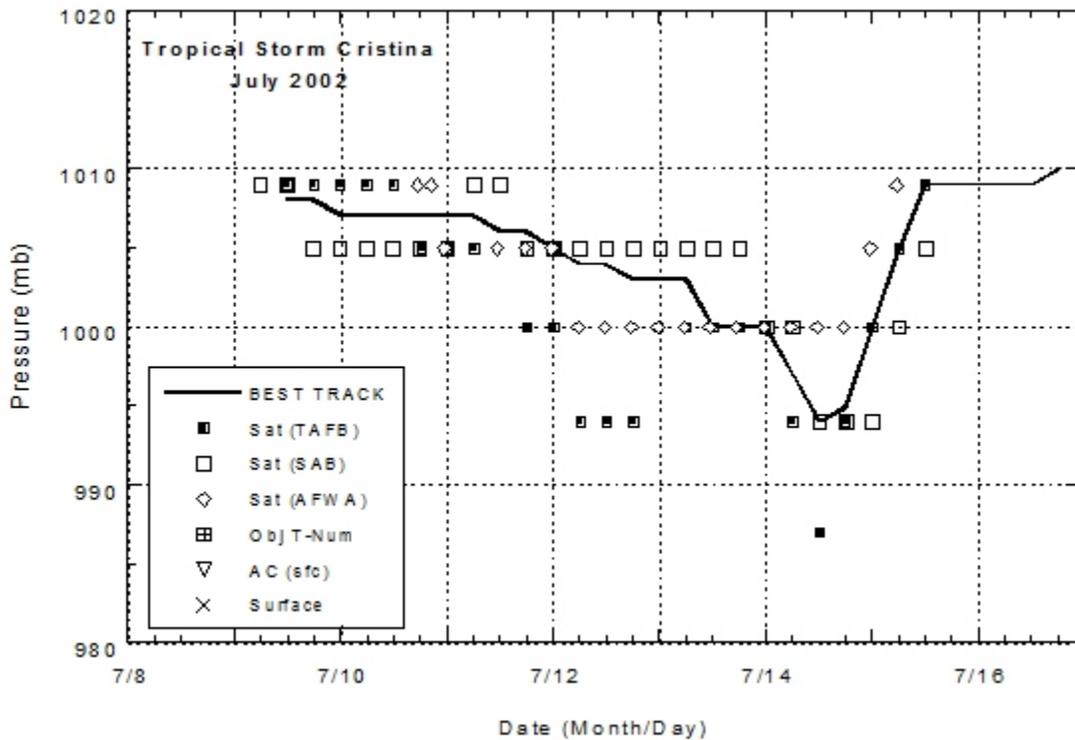


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Cristina, 9-16 July 2002.